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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of

FRIEDRICH et al.

Serial No. 09/235,242

Filed: January 22, 1999

Group Art Unit: 1626

Examiner: Stockton

For: PREPARATION OF BETA-ALKOXYNITRILES

Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

BRIEF ON APPEAL

Sir:

This Appeal is from the Examiner's Final Rejection of February 16, 2000.

REAL PARTY IN INTEREST

The real party in interest is BASF Aktiengesellschaft, of Ludwigshafen, Germany. Reel 9734, Frame 0065, recorded on January 22, 1999.

RELATED APPEALS AND INTERFERENCES

To appellants' knowledge and belief, there are no interferences or other appeals which will directly affect or be directly affected by or have a bearing on the Board's decision in this application.

STATUS OF CLAIMS

The claims before the Board are claims 2-6. The claims stand rejected under 35 USC § 103 as being unpatentable over US 4,617,154 (Green) in view of US 4,231,956 (Sullivan) and US 5,196,589 (O'Lenick).

A copy of the appealed claims is appended hereto.

STATUS OF AMENDMENTS

The claims have not been amended after final rejection.

SUMMARY OF INVENTION

The invention is a process for producing β-alkoxyamines. In a first step, an α,β-unsaturated nitrile reacts with a monohydric, dihydric or trihydric alcohol in the presence of a basic catalyst to form a β-alkoxynitrile. In a second step, the β-alkoxynitrile is hydrogenated in the presence of a hydrogenation catalyst, without prior removal or neutralization of the basic catalyst used in the first step. That basic catalyst is set forth by generic formula in the claims as a class of diazabicycloalkenes.

The major advantage of appellants' process is that, when the recited catalysts are used in step a), it is not necessary to neutralize or remove them prior to the hydrogenation of step b). That advantage is readily seen to be of economic importance, particularly in industrial scale processes. The limitation "without prior removal or neutralization of said basic catalyst" is recited in the independent claim.

ISSUE

Is the subject matter of claims 2-6 obvious within the meaning of 35 USC 103 over Green in view of Sullivan and O'Lenick, or more generally in view of the combined teachings of the three references and all other evidence of record.

GROUPING OF CLAIMS

Claim 6 is an independent process claim. Claims 2-5 are process claims dependent from claim 6, and none of the claims have been argued separately.

ARGUMENT

The following legal authorities are relied on in the following legal arguments in the order in which they are cited.

In re Bush, 296 F.2d 491, 131 USPQ 263 (CCPA 1961).

In re Baird, 16 F.3d 380, 29 USPQ 1550 (Fed. Cir. 1994).

Akso N.V. v. U.S. International Trade Commission, 808 F.2d 1471, 1480, 1 USPQ2d 1241, 1246 (Fed. Cir. 1986).

In re Marshall, 578 F.2d 301, 198 USPQ 344 (CCPA 1978).

MPEP § 2111.03.

In re Rinehart, 531 F.2d 1048, 1053-54, 189 USPQ 143, 148 (CCPA 1976).

In re Piasecki, 745 F.2d 1468, 1472-73, 223 USPQ 785, 788 (CCPA 1976), citing *In re Rinehart*, *supra*.

Appellants submit that the instant claims are not obvious from the combined teachings of the three references relied on by the examiner no matter how the rejection may be explicated, i.e., whichever is considered to be "primary" and taken in view of the other two. That issue is raised because the examiner has exposited the rejection as being based on Green in view of Sullivan and O'Lenick, whereas appellants are of the opinion

that O'Lenick represents the closest prior art (the entire two-step process), and a more logical exposition would be to consider O'Lenick in view of the other two references. At any rate, such matters of exposition are of no particular legal significance, and the issue actually is whether or not the claims are obvious from the combined teachings of the references. *In re Bush, supra.*

The evidence of record includes the three references cited by the examiner, an extract from Volume 5 of Organic Reactions (Bruson) cited by appellants and the working examples in the instant application.

Green teaches a reaction that corresponds in part to the first step of the here claimed two-step process, i.e., the addition of alcohols (or amines) to an activated olefin broadly, e.g., acrylonitrile. The reaction is disclosed as being catalyzed by diazabicycloalkenes within the class recited in the instant claims. However, Green does not disclose any subsequent reaction of the alkoxynitrile product. Green also discloses that the diazabicycloalkenes can catalyze the reverse reaction to yield the original alcohol and unsaturated nitrile (col. 4, lines 12-16, and Example 14), a factor which would suggest that the catalyst should be removed prior to any subsequent reaction, particularly at elevated temperatures. In fact, Green teaches that it is necessary to remove addition product from the reaction mixture as it is formed: col. 4, lines 25-32.

Appellants' claims can not rationally be read to include Green's process of product removal because of the explicit limitations "without prior removal or neutralization of said

basis catalyst" and "hydrogenation...in the presence of...the catalyst of formula I." The Green disclosure actually explicitly teaches away from permitting the catalyst to remain in contact with the desired product. *In re Baird*, *supra*; *Akso N.V. v. U.S. International Trade Commission*, *supra*; and *In re Marshall*, *supra*.

The disclosure of O'Lenick is additional proof of appellants' position that removal of alkaline catalyst has been considered necessary prior to hydrogenation in this art (col. 1, lines 50-55). However, the solution to this problem disclosed by O'Lenick is the addition of stable free radical acrylonitrile polymerization inhibitors to the reaction corresponding to appellants' step a) (see col. 1, lines 7-22 and the working examples). When such stable free radical compounds are not used, only poor yields are obtained (see Examples 1 and 10). Even where free radical inhibitors are used, yields in general are lower than those achieved in appellants' working examples. The average yield in Examples 3 to 9 and 11 to 19 (those in which stable free radical compounds were used) was 84.5%, whereas the average yield of appellants' three working examples was 94.5%. Appellants claims recite that the process "consists essentially" of specific reaction parameters and could not properly be interpreted as including stable free radical polymerization inhibitors since such materials are expressly shown by O'Lenick to "materially affect" the inventive process. MPEP § 2111.03 and cases cited therein.

The disclosure of Sullivan does not appear to add anything significant to the disclosure of Green. Essentially the same process is disclosed also using relevant

diazabicycloalkenes as basic catalyst. Since only thioanalogs of the alcohols of Green and the present claims are disclosed, the reference is of less direct relevance than Green. However, it must be noted that Sullivan is relevant as evidence of the prior state of the art described in appellants' specification and as set forth in Green, i.e., the importance of neutralizing the basic catalyst "as soon as possible" after completion of the process corresponding to appellants' step a) (col. 7, lines 12-26).

Bruson discloses (p. 90) that the cyanoethylation of alcohols (appellants' step a)) "is an equilibrium reaction" and that "the products are readily dissociated by heat in the presence of alkalies into the original alcohol and a polymer of acrylonitrile" and that prior to isolation of the products, "the alkaline catalyst must be destroyed by acidification or neutralization." This is a still further teaching of the difficulties in the prior art alleged by appellants and disclosed in each of the three references relied on by the examiner. Green at col. 4, lines 12-16 and 25-29 and Example 14. Sullivan at col. 7, lines 12-16. O'Lenick at col. 1, lines 24-56.

There are three working examples of the entire two step process in appellants' specification -- Examples 5, 7 and 8. The yield of desired product was 88%, 95.9% and 96.9%, respectively. In view of the evidence of record that one of ordinary skill in this art would not have expected the hydrogenation step to be successful without prior neutralization or removal of the alkaline catalyst, these results are surprising and unexpected. That is to say, there would have been little expectation of success at the

demonstrated level for appellants' process. *In re Rinehart, supra.* Appellants believe that even if only the three references relied on by the examiner were considered, they would not amount to sufficient evidence of obviousness to support a *prima facie* case. As discussed at length above, from those references one of ordinary skill in the relevant art would not have been motivated to carry out the two step process claimed using the specific catalysts recited in the first step, and then intentionally permitting the alkaline catalyst of the first step to remain in the reaction mixture during the hydrogenation step. When the record as a whole is considered, including all of the evidence present in the record, including the additional negative teaching of Bruson and the exceptional yields demonstrated in appellants' working examples so that the final conclusion rests "upon evaluation of all facts in evidence," that conclusion must be one of unobviousness of the subject matter here claimed. *In re Piasecki, supra*, citing *In re Rinehart, supra.*

CONCLUSION

The combined teachings of Green, Sullivan and O'Lenick do not support a *prima facie* case of obviousness. The combined teachings of the three aforementioned references taken together with Bruson and the evidence in appellants' working examples lead to a conclusion of nonobviousness of the subject matter of appellants' claims.

For the foregoing reasons it is respectfully submitted that reversal of the examiner's rejection of claims 2-6 is in order.

Please charge any shortage in fees due in connection with the filing of this paper,

including Extension of Time fees to Deposit Account No. 11.0345. Please credit any excess fees to such deposit account.

Respectfully submitted,
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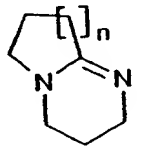
APPENDIX

2. A process as claimed in claim 6, wherein the catalyst used in the first step is a diazabicycloalkene of the formula Ia



(Ia),

where from 1 to 4 hydrogen atoms on the diazabicycloalkene nucleus may be independently replaced by the radicals R^1 to R^4, in which case R^1, R^2, R^3 and R^4 are each C_{1-20}-alkyl, C_{6-20}-aryl or C_{7-20}-arylalkyl, and
n is an integer from 1 to 3.

3. A process as claimed in claim 6, wherein the catalyst used in the first step is 1,5-diazabicyclo(4.3.0)non-5-ene (DBN), 1,5-diazabicyclo(4.4.0)dec-5-ene (DBD) or 1,8-diazabicyclo(5.4.0)undec-7-ene (DBU).

4. A process as claimed in claim 6, wherein the catalyst in the first step is used in an amount of from 0.05 to 5% by weight, based on the alcohol.

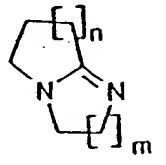
5. A process as claimed in claim 6, wherein the reaction of the first step is carried out at from 25 to 100°C.

6. A process for preparing a γ-alkoxyamine by

a) reaction of an α,β-unsaturated nitrile with a monohydric, dihydric or trihydric alcohol in the presence of a basic catalyst at from -20 to 200°C to form a β-alkoxynitrile, and

b) subsequent hydrogenation of the β-alkoxynitrile in the presence of a hydrogenation catalyst, without prior removal or neutralization of said basic catalyst,

which consists essentially of using in the first step a diazabicycloalkene catalyst of the formula I



(I),

where from 1 to 4 hydrogen atoms on the diazabicycloalkene nucleus may be independently replaced by the radicals R^1 to R^4, in which case R^1, R^2, R^3 and R^4 are each C_{1-20}-alkyl, C_{6-20}-aryl or C_{7-20}-arylalkyl, and
n and m are each an integer from 1 to 6, and effecting the hydrogenation in the second step at from 50 to 250°C in the presence of a hydrogenation catalyst and of the catalyst of the formula I.